

Barrande and the author of the article have restricted their remarks almost entirely to the trilobites, I will only ask to be allowed space to reply to the facts stated with regard to these forms of life. Trilobites have now been discovered as low down as 4,000 ft. in these red and green rocks at St. David's, that is, in the very earliest fauna known, and amongst them are forms hitherto not discovered in any other country; still if we are to believe with some that we are here near the beginning of life on the globe, or even of trilobitic life, we can expect but little evidence to support or to disprove Darwinism. For, considering the frequent changes in the sea bottom which must have taken place at this period, to produce at one time a shingle, then a sand or grit, and then a fine muddy deposit, and such beds frequently repeated, we cannot possibly expect that during all these physical changes an unbroken record of these forms should be preserved to us. No, rather we should expect to find that the necessary migrations would produce alterations in the forms, and that they should now and again return modified and altered in proportion to the time which had intervened and the circumstances which surrounded them. And this is really what we do find, and which is apparent at once to the palæontologist, who is prepared to allow and to recognise in these very marked physical changes a controlling influence capable of greatly affecting the life of the period. Again, can any one really believe, when thinking of the enormous time which must have elapsed during the accumulation of the great Laurentian series, and possibly of other series previous and succeeding, all antecedent to the time when the Cambrian fauna made its appearance, that the seas in which these were deposited were entirely barren of life? Surely not; therefore, why so readily jump at conclusions when there is so much room for doubt? Again, this Cambrian fauna is not without evidence in favour of evolution. Trilobites we know develop by increase of the body segments, and therefore M. Barrande says that the earliest trilobites should have the smallest number of segments in the thorax—"but that those of the primordial fauna are generally characterised by the opposite condition, while the number is less in those of the succeeding faunas." Now it does not seem to have occurred to M. Barrande that trilobites show every indication of having culminated at or about this period, that they had attained their maximum size and development, and that from this time they seem to have gradually diminished in size, and to have degenerated, doubtless much in the order in which they had previously progressed. This will explain also why the number of segments should, as he says, diminish in number in the genera of succeeding faunas. One of the very earliest trilobites we know of is the little *Agnostus*. It is also the simplest and apparently the most rudimentary of the group. It has no eyes, only two segments to the thorax, and usually an ill-defined glabella. In tracing a species of *Paradoxides* from the earliest stage upwards, I was struck with the very great resemblance which, at an early stage, it had to the little *Agnostus*. The glabella was indistinct, and much shorter in proportion to the length of the head than in the fully grown specimen, and the eye very faint, scarcely marked out, and the outline of the head more evenly rounded, with scarcely any indication of spines. Before the discovery of the Cambrian fauna at St. David's, no genus of trilobites had been found with four segments to the thorax, therefore we had to jump from one with two to one with six, as in *Trimucleus* or *Ampyx*. Now, however, since the discovery of *Microdiscus* with four segments, the gap has been filled up, and the genus, unfortunately for those holding M. Barrande's views, appears in our earliest fauna, and where the evolutionist would be most inclined to look for it. It is also a most interesting and instructive genus. It is somewhat larger than *Agnostus*, but like it, has no eyes. The glabella is better formed, more distinctly marked off from the cheeks, and instead of being irregularly grooved, as is usually the case with *Agnostus*, it is furrowed regularly as in an advanced stage in the development of *Paradoxides*. In the caudal portion the axis is partly divided into segments, and in one species the lateral lobes are slightly grooved as if into rudimentary pleuræ. It is very plentiful in the beds at St. David's, and since its discovery there, species have also been found in Canada and elsewhere.

From this stage forms have been found to represent every step in development as to the number of segments, and indeed often to show marked stages in other parts. *Anopolenus* is really a *Paradoxides* with enormous eyes, reaching to the hinder margin, and with several of the hinder pleuræ consolidated together to

form a large spinous pygidium. Another *Paradoxides* has the eyes nearly as large as *Anopolenus*, but with a few more segments to the thorax, and a smaller pygidium. Other species show various gradations in the eyes and in the pygidium until we attain to *P. Davidis*, which has small eyes, a small pygidium, and the greatest number of thoracic segments. Indeed there are forms to represent almost every stage, and there can I think be no doubt that in the fauna of the Tremadoc group, which is separated from the earlier Cambrian by several thousand feet of deposits indicating a period of very shallow water in which large brachiopods and phyllopod crustaceans were the prevailing forms of life, we witness a return to very much the same conditions as existed in the earlier Cambrian periods, and with these conditions a fauna retaining a marked likeness to the earlier one, and in which the earlier types are almost reproduced, though of course greatly changed during their previous migrations. The *Niobe* (?) recently found in the Tremadoc rocks is truly a degraded *Paradoxides*, retaining the glabella and head spines, but with the rings of the thorax, excepting eight, consolidated together to form an enormous tail. Instead therefore of having here, as stated by M. Barrande, "a very important discord between Darwinism and facts," we find in these early faunas facts strongly favouring such a theory, and in support of evolution.

Hendon, Jan. 27

HENRY HICKS

ACCORDING to a notice in NATURE, vol. ix. p. 228, a distinguished continental naturalist finds an important discordance between Darwinism and certain facts connected with Trilobites and other fossil crustaceans. But his argument appears to be based on an assumption that we are acquainted with a "primordial fauna," that we are justified in dating the beginnings of life at or near some known geological period. This, however, the whole history of geology ought to make us less and less inclined to believe. It is one of those assumptions, essentially based on ignorance, on which so little dependence can rightly be placed. We have no right to call any fauna the *earliest*, merely because, as it happens, we know of none *earlier*.

A point is made of the fact that the earlier known Trilobites have more segments than the later, while individual Trilobites, as they develop, increase in number of their body segments. It may be granted at once that in this case the development of the individual is not an accurate picture of the past development of the species. But Fritz Müller has long ago shown that we could not, on principles of Darwinism, expect it always to be so; and surely, if Trilobites have been gradually developed rather than abruptly created, there must have been Trilobites with *few* before there were Trilobites with *many* segments, so that after all, the development of the individual will carry us back to an early stage in the history of the family. It could scarcely be expected to give us all the alternations and complications which that history may have presented in its whole course.

Those who on other grounds accept the theory of evolution, far from finding any obstacle to it in the large number of genera of Silurian Trilobites, will consider the largeness of that number clear evidence that life in general, and Trilobite life in particular, must have flourished on the globe for a very long period prior to the Silurian age.

The argument that we do not find connecting links between different genera has little immediate force. It must await the verdict of time and further investigation. Of 252 species of Trilobites, 61 are assigned to England. The true reading of this piece of statistics must surely be that that which great research has done for a small area may be equalled, and far surpassed, when as close a scrutiny is applied to the whole available surface. If no gaps between species, and genera, and orders are filled by the results of such a search, then it will be time to say that we have "an important discord between Darwinism and facts."

Torquay, Jan. 27

THOMAS R. R. STEBBING

Perception in Lower Animals

I RELATE the following, as it has some bearing on a question lately ventilated in NATURE.

A friend and myself were watching on one occasion the actions of two half-bred Persian cats on seeing for the first time a freshly caught cobra, which had been placed in a wire-gauze covered box near the verandah. First of all one of the cats, a black one, stalked carefully up to the box in which the snake was keeping up a perpetual "swearing," with extended hood, and after a

minute survey, crept away about 7 or 8 ft. off and sat down with its back to the snake. The other cat, a white one, now caught sight of the strange object, and, in a like stealthy manner, advanced to within a few inches of the gauze, and was in the act of examining the cobra, when my friend, to see the result of a sudden sound—for up to this time we had both been still as mice—moved his feet on the gravel. Had the effect been due to electricity, it would not have been more instantaneous, nor more startling. At the first grate of the pebbles the white cat flung himself backwards, tumbling—to use expressive terms—“heels over head” and “all of a heap” for about a couple of yards; whilst the black cat shot vertically upwards to somewhere near four feet in height, the impulse given by the spring of his hind legs being sufficient to throw these and his tail higher than his head.

Now both these cats are tame, and bold to such a degree that they reign supreme over all the dogs in the house, so that their great timidity on this occasion was evidently due to a perception of danger. I have since found, however, that all snakes are not equally feared by them. They will let the harmless green tree snake (*Passerita mycterizans*) twine round them without showing any signs of repugnance, and some other harmless snakes receive but little notice from them. Why is this? Is it that the hood of the cobra renders it so frightful an object, or have the cats in their nocturnal wanderings been struck at by cobras? Such is possible, for we know that in nine cases out of ten the strike is made without intention to exert the deadly power of the fangs. I believe indeed that unless irritated by an attacking enemy, or to secure active prey such as rats, &c., the cobra never strikes viciously. Experience of the ease with which its fangs are drawn and its helplessness without them would teach it to be careful of them.

Mangalore, Sept. 17

E. H. PRINGLE

Earthquake in New Guinea

WHEN crossing the main land of New Guinea, from the Geelvink Bay in the north, to the south coast, I slept on the night of the 12th to the 13th of June, 1873, in the swamps of the MacCluer Gulf (famous for the murder of some of the crew and the ship's doctor of H.M.S. *Panther* and *Endeavour*, Capt. MacCluer, in 1791, and by the attack on Signor Cerruti, the Italian traveller, several years ago). About 2 A.M. of the 13th I awoke, in consequence of a rattling noise like that of gun-shooting. I roused my six Malay companions, who slept around me in a small native prau, seized my guns, and listened to what would follow. But nothing happened. It was unintelligible to me what had been the cause of this noise, the natives of these parts having no guns, so far as I knew, and even if they had intended an attack, would not announce their arrival by firing their guns, instead of approaching in silence. On the other hand, when sleeping in a virgin forest like that which bordered these swamps, crashing noises from falling trees and from animals breaking down rotten branches often occur, but never so many together.

Nothing more being heard we fell asleep again. At about 4 A.M. the same thing happened once more. I remained awake. At dawn the Papoos, whom I had brought with me from the north coast—ten men—came back to my resting-place; they had left me, to sleep apart, had heard the noise, but could not understand it either.

When on the 13th I came back to Papooan houses at the River Takasi, which falls into the MacCluer Gulf—a minute description of which will be published very soon in “Petermann's Mittheilungen”—I heard the account of a heavy earthquake, which had taken place the night before; this of course explaining the noises we had heard: many trees having broken down at the same moment in consequence of the movement of the ground. We did not feel the earthquake in our small boat, because it lay entirely in the swamp, which had not propagated the shock.

On the 18th I was back at my little schooner, which was at anchor in the Geelvink Bay, near a place called Passim. The earthquake had been felt here at the same time, accompanied by heavy underground thunder, and I could make out that the direction had been N.W. to S.E.

After some days I came to a place just at the foot of the so much spoken of Arfak Mountains, called Audai; the earthquake had been heavy here, and even more shocks were felt on the following day. The direction had been W.E. Several native houses, built on very high poles near the slope of a hill, were

destroyed, the Papoos (Arfaks) still frightened and of opinion that the earthquake had been “made” by their enemies, another tribe on the mountains.

But in the Bay of Dorey, which has so often been visited by expeditions to New Guinea and by naturalists, where I arrived a fortnight later, the shocks appeared to have been the heaviest. All the Papoos in the different settlements there were living on shore in small shelters or huts, hastily erected, whereas they are known always to live in those large houses on the water so often described. Several of these large houses had broken down, and the natives were still very much frightened; they would not remove into their houses on the water. On the island of Manaswari (Mansinam), in the Bay of Dorey, the seat of a missionary, the shocks had been from S.W. to N.E. I afterwards sought information about the extent of this earthquake, and made out that it was felt at Amberbaki, on the North coast of New Guinea, at Salwatti, the island in the North-west, and on the island of Tobie, in the east. The centre had been undoubtedly on the Arfak Mountains. Light earthquakes sometimes occur in New Guinea, heavy ones seldom. The destruction by the last heavy one in 1864 could even be seen by me in 1873 along the sea-shore from Dorey to Wariab, and up the Arfak Mountains, in the south of the bay of Dorey. Volcanic eruptions in these parts are not known or recorded from earlier times. But one of the tops of these mountain chains bears in the native language the name of “Fire Mountain,” and some of my hunters pretended to have seen on one of their excursions (some thousands of feet high) the ground split open quite fresh, in consequence of the earthquake, as they believed.

This earthquake has not been felt in Halmabeira and the Molukkos Islands, where shocks occurred some weeks afterwards, so that the convulsions, referred to above, appear to have been local ones in New Guinea.

DR. A. B. MEYER

Sensitive Flames at the Crystal Palace Concerts

LAST Saturday, Jan. 31, at the Crystal Palace, while Mr. Vernon Rigby was singing Beethoven's “Adelaide,” I heard what I thought was strangely out of place—an accompaniment to the song played on the highest notes of a violin, sometimes closely following the air note for note, at other times being one-third lower. I soon found that this proceeded from one or two sensitive gas jets, notwithstanding they were at the end of the winter concert-room farthest away from the orchestra. The very perfect manner in which they responded to every note, no matter how *piano*, was curious.

It happened that the gas pressure had just been increased. Had this occurred earlier the effect of Mme. Norman-Neruda's fine performance of Mendelssohn's violin concerto would have been totally destroyed, as far as regards a large part of the audience. This shows that it is a matter of no small importance in a concert-room to have the size and number of the gas-burners properly proportioned to the gas supply.

King's College, Feb. 3

W. N. HARTLEY

THE PHOTOGRAPHIC SOCIETY

THE metropolitan photographic journals contain evidence that the Photographic Society of London is menaced with revolution or dissolution. If both were to befall it, the interests of Science would hardly suffer, since a more singularly inefficient organisation, under the guise of a scientific body, it would be difficult to find, or one whose results in the scientific world are so trivial.

It is difficult indeed to conceive that a society into whose hands, *faute de mieux*, the recognition and fostering of research in so important a branch of science as photography has fallen, should have done absolutely nothing for so many years but organise itself into a pocket borough in the direction of which no man of eminent scientific capacity takes part; which not only has no scientific reports or even investigations, but seems to care only to make of itself a weak mimicry of an art club. The chief objects of which are to prove that a photographer ought to have a chance for the Royal Academy, to discuss the most effective style of getting up portraits to